Supplementary Materials

Table S1. States and definitions for the bark beetle, storm damage, and damaged biomass model.

Network	Name	Explanation	States
Bark Beetle submodel	Dry period	Number of periods	>2; 2; 1; 0
	Stand age	Age of a given stand	>100; 90–100; 60–79; <60
	Fire damages	Pre-damage (current damage) caused by forest fire	high; moderately high; moderately low; low
	Snow damages	Pre-damage (current damage) caused by snow breakage	high; moderately high; moderately low; low
	Wind damages	Pre-damage (current damage) caused by storm damage	high; moderately high; moderately low; low
	Canopy closure	Measurement of canopy closure. Closed stands offer better bark beetle development because of higher microclimate temperature. In dense stands bark beetle predisposition is higher due to the higher competition on water.	closed; dense; sparse; open
	Share of N. spruce	Proportion of Norway spruce in the stand	>70; 50–70; 25-–49; 10–25; <10
	Stand vitality	Qualitative criterion	very high; slightly reduced; low
	Previous disturbances	Sum of disturbance influences of the last observation on stand level	positive; no trend; negative
	Stand predisposition	Subsumes stand specific predisposition	high; moderately high; moderately low; low
	Bark beetle predisposition	Subsumes the overall bark beetle predisposition	high; moderately high; moderately low; low
Storm submodel	Stand age	Age of a given stand	>100; 90–100; 60–79; <60
	Thinning intensity	thinning intensity. Intensity of maintenance	high; medium; low; none

	Soil type	Rooting depth, share of particles of sand, minerals and gley	brown soil and others; rendsina/ranker; pseudogley; gley
	Temperature	Mean temperature of the period	above zero; around zero; below zero
	H^2O saturation	Node to describe the hydrology	excessively drained; well drained; moist; wet
	Roughness	Roughness to describe the vertical closure	rough, irregular; groups of dominant trees; single dominant trees; even
	Canopy closure	Roughness to describe the horizontal closure	closed; dense; sparse; open
	Proportion of Hardwood	Proportion of hardwood in the given stand	≥30%; <30%
	H/D value (conifers)	Height/diameter value of conifers	>100; >85; >60; <60
	Fire damages	Pre-damage (current damage) caused by forest fire	high; moderately high; moderately low; low
	Snow damages	Pre-damage (current damage) caused by snow breakage	high; moderately high; moderately low; low
	Bark beetle damages	Pre-damage (current damage) caused by bark beetle	high; moderately high; moderately low; low
	Site specific stability	Subsumes the site-specific criteria (high to low)	high; moderately high; moderately low; low
	Stand specific stability	Predicted phy. Stand stability	very high; slightly reduced; low
	Previous disturbances	Sum of disturbance influences of the last observation on stand level	positive; no trend; negative
	Stand stability	Subsumes the site- and stand-specific criteria (high to low)	high; moderately high; moderately low; low
	Wind breakage predisposition	Predisposition to storm damage	high; moderately high; moderately low; low
Damaged Trees model	Wind intensity		breeze (>10); slight wind (>30); strong wind (>60); storm (>75); orcane (>120)
	Wind predisposition	Probability of storm damage regarding various attributes	high; moderately high; moderately low; low

	Wind breakage	Subsumes the damage potential and the probability of the wind breakage to forest damage items	whole stand; horst (>group and less than 0.5 ha); group of trees (>5 trees, less than tree length); single trees; no damage
	Temperature	GDD (certain number of days below threshold)	70; 140; 210; 280
	Bark beetle population density	Generations of bark beetle in the given timeframe	≥2 generations; 1 generation; <1 generation
	Bark beetle predisposition	Probability of bark beetle outbreak with regard to bark beetle population and the BB predisposition	yes; no
	Bark beetle damage intensity	Subsumes the damage potential and the probability of a bark beetle outbreak to forest damage items	whole stand; horst (>group and less than 0.5ha); group of trees (>5 trees, less than tree length); single trees; no damage
	Quantity of damaged trees	Sum of damaged biomass for all considered disturbance agents	whole stand; horst (>group and less than 0.5ha); group of trees (>5 trees, less than tree length); single trees; no damage

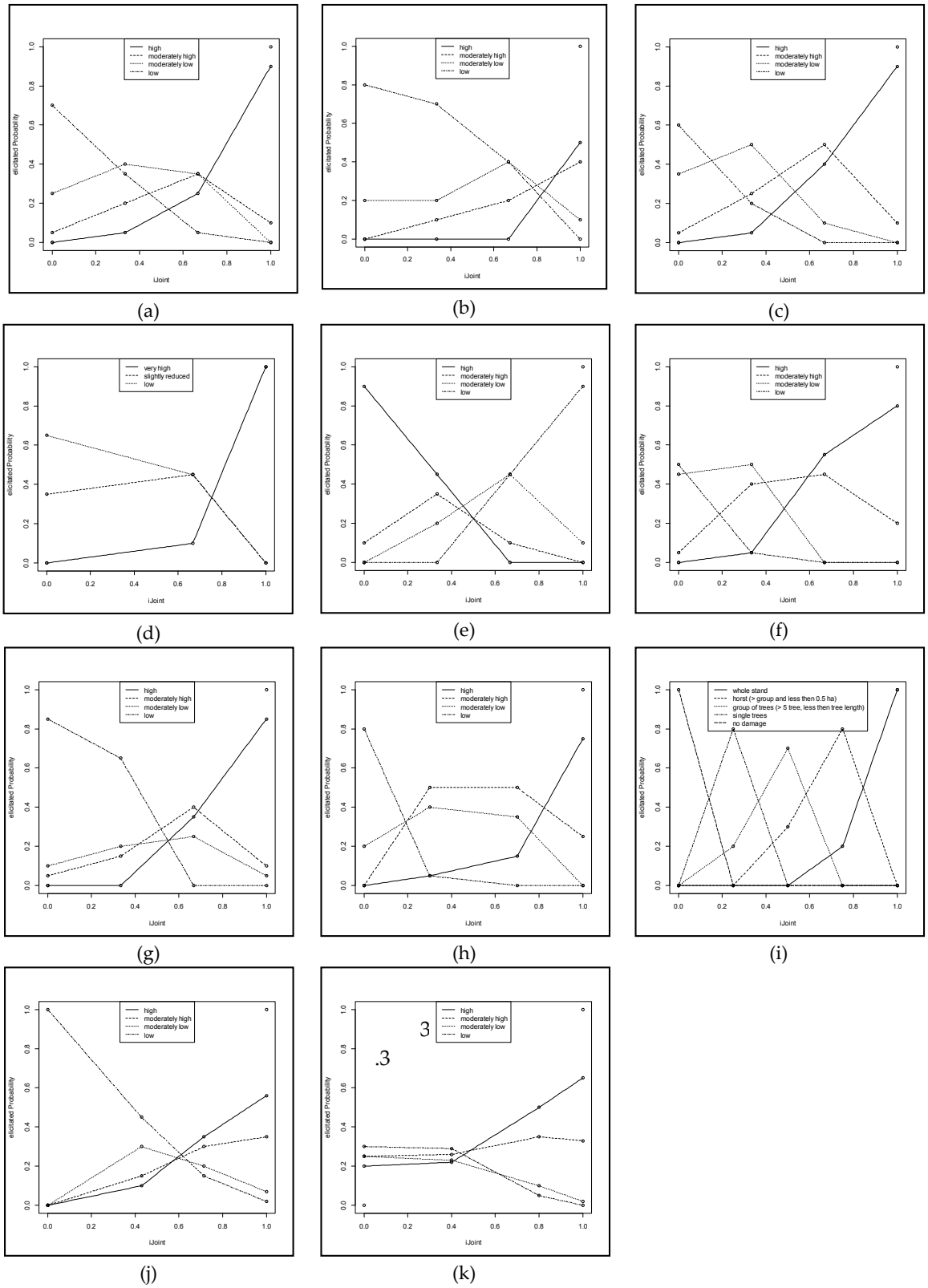

Figure S1. CPT Approximation tables of the bark beetle disturbance submodel ((a) Bark beetle predisposition, (b) Stand predisposition, (c) Previous disturbances and (d) Stand vitality), the storm DA ((e) Storm damage Predisposition, (f) Stand stability, (g) Previous disturbances and (h) Stand stability) and for the Damaged Trees Network ((i) Quantity of damaged trees, (j) Wind damage intensity and (k) Bark beetle damage intensity).